

ABSTRACT OF THE DISCLOSURE

Methods for permanently introducing patterns in electro-optic crystals are provided, by forming patterned variations in the composition of the electro-optic crystals, during the crystal growth process. These methods open a way to a family of light-controlling devices that can operate at temperatures as high as 80 degrees centigrade, and may be stored at temperatures as high as 300 degrees centigrade. Additionally, they may withstand radiation of natural light and cosmic ray. In accordance with one embodiment, an electrically controlled Bragg grating (ECBG) is introduced into a crystal, by a permanent periodic spatial variation of its composition, forming permanent periodic striations. The periodic striations induce a spatial modulation of the dielectric constant, and the application of a uniform electric field produces an induced polarization grating. The latter induces an electrically controlled birefringence grating through the electrooptic effect. In accordance with another embodiment, the permanent periodic striations introduce permanent birefringence, which may be tuned and detuned with an application of an electric field. Additionally, other patterns, for example, striations of varying thickness, and (or) varying periodicity, or a single layer of a different composition may also be introduced into the crystal, for various applications.